



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/705,599	11/10/2003	Christopher M. Weikart	62274B	5566

109 7590 09/20/2007
THE DOW CHEMICAL COMPANY
INTELLECTUAL PROPERTY SECTION, P. O. BOX 1967
MIDLAND, MI 48641-1967

EXAMINER

LAFOND, RONALD D

ART UNIT	PAPER NUMBER
----------	--------------

1762

MAIL DATE	DELIVERY MODE
-----------	---------------

09/20/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/705,599	WEIKART ET AL.	
	Examiner	Art Unit	
	Ronald D. Lafond	1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 November 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 13 and 16-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12, 14 and 15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>03/01/2004, 07/02/2004</u> . | 6) <input type="checkbox"/> Other: _____ |

Art Unit: 1762

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of Group I and, further, of Species I/A (wherein the porous injector has porosity increasing in a stepwise fashion) in the reply filed on July 20, 2007, is acknowledged. The traversal is on the ground(s) that it would not be burdensome for the Examiner to examine both Groups. This is not found persuasive because the searches for a method of forming a protective barrier and a plasma deposition apparatus are in fact not similar. Furthermore, although the apparatus is related to the method, a serious burden exists in the differing issues likely to arise during prosecution of the different inventions.

The requirement is still deemed proper and is therefore made FINAL.

2. Claims 13 and 16 – 20 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected Species and Invention, respectively, there being no allowable generic or linking claims. Applicant timely traversed the restriction (election) requirement in the reply filed on July 20, 2007.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1 – 12, 14, and 15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

5. Regarding Claim 1, the term "oxygen-rich" is a relative term which renders the claim indefinite. The term "oxygen-rich" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. For the purposes of compact prosecution, the Examiner will interpret the term "oxygen-rich" as being inclusive of any atmosphere/stream that contains oxygen.

Art Unit: 1762

6. Claims 2 – 12, 14, and 15 are rejected in view of the flaws under 35 U.S.C. 112, second paragraph, of Claim 1 from which they depend.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1, 2, and 6 – 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Namiki (United States Patent 5,641,559) in view of Thomas, et al. (United States Patent 5,378,510, hereafter Thomas).

9. Regarding Claim 1, Namiki teaches a process for preparing a protective barrier for a container having an internal surface (see Column 2, lines 12 – 16, and Column 14, lines 34 – 35 and Figure 3) comprising the steps of: a) plasma polymerizing under partial vacuum (see Column 6, lines 10 – 31 and lines 55 – 67) and in an oxygen-rich atmosphere a first organosilicon compound under conditions to deposit a polyorganosiloxane layer of uniform thickness (see Column 8, lines 20 – 30 and Table 1 on Column 7, lines 1 – 18); and b) plasma polymerizing under partial vacuum a second organosilicon compound under conditions to deposit a silicon oxide layer of uniform thickness superposing the same polyorganosiloxane layer (see Column 10, lines 40 – 57, and Claims 1 and 4 on Column 14, lines 64 – 66, Column 15, lines 1 – 6, and Column 16, lines 1 – 12).

10. Namiki does not teach that the plasma polymerized layers are deposited onto the internal surface of the container. However, Thomas teaches just such a limitation, wherein "a barrier coating is formed on a polymeric article, such as on the interior of a thermoplastic container" (see Abstract). Moreover, Thomas teaches the deposition of these barrier layers to solve the same problem that Namiki addresses, which is the use of plasma polymerized layers in order to make these composites less permeable to atmospheric gases (see Column 2, lines 12 – 24 of Namiki; and Column 1, lines 14 – 68, and Column 2, lines 1 – 58). Therefore, it would have been obvious to one having ordinary skill in the art at the time of the present

Art Unit: 1762

invention to have modified the method taught by Namiki by depositing a protective barrier onto the internal surface of the container as taught by Thomas, because both Namiki and Thomas disclose coating containers with plasma polymerized films in order to reduce permeability of these composites to atmospheric gases.

11. Regarding Claim 2, Namiki does not explicitly teach the limitation wherein plasma polymerizing steps are carried out at such power densities and concentrations of the first and second organosilicon compounds and for such a time so that the combined thickness of the polyorganosiloxane and silicon oxide layers is less than 400 Å. However, Namiki does teach that the combined thickness of the polyorganosiloxane and silicon oxide layers may be 400 Å (see Column 3, lines 57 – 60, wherein Namiki teaches that the polymerized organosilicic layer is 0.01 µm, which is 10 nm or 100 Å; and Column 4, line 5, wherein Namiki teaches that the silicon oxide film layer is 0.03 µm, which is 30 nm or 300 Å). It would have been obvious to one having ordinary skill in the art at the time of the present invention to have modified the method taught by Namiki in view of Thomas by plasma polymerizing the silicon oxide layer to a thickness of slightly less than 300 Å such that the total thickness of the two layers was less than 400 Å with a reasonable expectation of creating a functioning protective barrier, because Namiki teaches that controlling the growth of the first layer to only 100 Å is possible, which implies that it is possible to similarly control the growth of the silicon oxide layer to such thin limits, and because Namiki does not teach away from thinner silicon oxide layers of less than 300 Å by stating that this thickness is critical to the barrier layer performance.

12. Regarding Claim 6, Namiki teaches the process wherein the polyorganosiloxane is represented by the formula $\text{SiO}_x\text{C}_y\text{H}_z$, where x is 2.3, y is 0.4 and z is greater than or equal to zero (see Table 1, Comparison Example 3, on Column 7, line 16, and Claims 1 and 4), and the silicon oxide layer is represented by the formula SiO_x , where x is from 1.5 to 2.0 (see Column 10, lines 40 – 57, and Claims 1, 2, and 4, on Column 14, lines 64 – 66, Column 15, lines 1 – 10, and Column 16, lines 1 – 12).

13. Regarding Claims 7 and 8, Namiki teaches the process wherein the container comprises a plastic that may be polyethylene terephthalate, polyethylene, polypropylene, etc. (see Column 5, lines 12 – 20, Column 10, lines 27 – 28, Column 14, lines 33 – 46, and Claim 4 on Column 16, lines 1 – 12).

Art Unit: 1762

14. Regarding Claim 9, Thomas teaches the process wherein the oxygen and the first and second organosilicon compounds are fed through an injector which is open-ended (see Column 11, lines 57 – 65, and Figures 1 and 2).

15. Claims 3 – 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Namiki in view of Thomas, and further in view of Nemani, et al. (United States Patent Application Publication US 2002/0142104 A1, hereafter Nemani) and Goto, et al. (United States Patent 6,451,390 B1, hereafter Goto). Namiki and Thomas are cited for the same reasons discussed above, which are incorporated herein.

16. Regarding Claim 3, Namiki in view of Thomas does not teach the method wherein the first plasma polymerizing step is carried out at a deposition rate of greater than 50 Å/sec and less than 500 Å/sec and the second plasma polymerizing step is carried out at a deposition rate of greater than 10 and less than 100 Å/sec. Nemani teaches the plasma polymerization of organosilicon compounds in the presence of oxygen and under partial vacuum to form polyorganosiloxane layers at such power densities, concentrations, deposition times and other parameters to enable deposition rates of about 16.6 Å/sec to about 333 Å/sec (0.1 microns/minute to 2 microns/minute) (see Paragraphs [0034] – [0038]). It has been held that, in the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art,” a *prima facie* case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ OP (CCPA 1976). See also MPEP 2144.05. Therefore, it would have been obvious to one having ordinary skill in the art at the time of the present invention to have modified the method taught by Namiki in view of Thomas by employing the plasma deposition conditions taught by Nemani to have deposited the polyorganosiloxane layer at the rates taught by Nemani, because Nemani teaches that such conditions and rates are known in the art to deposit organosilicon/organosilane materials as required by Namiki in view of Thomas.

17. Similarly, Goto teaches the plasma polymerization of silicon oxide using an organosilicon compound in the presence of oxygen and under partial vacuum and at such power densities and concentrations to enable a deposition rate of 18.3 Å/sec (1100 Å/min) (see Column 3, lines 24 – 53). Therefore, it also would have been obvious to one having ordinary skill in the art at the time of the present invention to have modified the method taught by Namiki in view of Thomas and Nemani by employing the

Art Unit: 1762

plasma deposition conditions taught by Goto to have deposited the silicon oxide layer at the rate taught by Goto, because Goto teaches that such deposition rates conditions and rates are known in the art.

18. Regarding Claim 5, Namiki in view of Thomas, Nemani, and Goto does not explicitly teach the limitation wherein the total plasma polymerizing deposition time is not more than 10 seconds. However, as discussed, Namiki does teach polyorganosiloxane layers of 100 Å thickness and silicon oxide layers of 300 Å thickness. Moreover, Goto teaches, in Column 3, lines 34 – 52, that "in one embodiment of the method for producing a silicon dioxide film of the invention, the silicon dioxide film is deposited at a rate at of less than 1100 angstroms/min, and the energy for plasma generation is intermittently supplied at a supply time interval of, for example, 1150 watts for 1 second and brought to at or about, for example, zero watts, for a time interval of, for example, 3 seconds. One skilled in the art would readily appreciate that deposition rate is hardware dependent. Thus, one skilled in the art would also readily appreciate that the required rate and the required pulse strength and on and off time as well as the required specific parameters to achieve a film having a desired film thickness are machine dependent. For example, by adjusting the parameters of the pulse ... and duty cycle ..., films of a desired thickness can be achieved. The method of the invention allows films thinner than 300 Å, e.g., 200 Å, or films thicker than 300 Å to be achieved." Therefore, it would have been obvious to one having ordinary skill in the art at the time of the present invention to have modified the method taught by Namiki in view of Thomas, Nemani, and Goto by using the guidance regarding deposition conditions and rates taught by Nemani and Goto to have deposited the thin layers of polyorganosiloxane and silicon oxide at the desired thicknesses because there would have been a reasonable expectation of success of achieving such thicknesses, given the overall teachings.

19. Regarding Claim 4, Namiki in view of Thomas, Nemani, and Goto does not explicitly teach the limitation wherein the second plasma polymerizing step is carried out at a deposition rate of not less than 30 Å/sec and not greater than 60 Å/sec. However, as discussed above, Goto is teaching that the deposition rate is a result effective variable. It is the Examiner's position that it would have involved only routine experimentation to one having ordinary skill in the art to determine an optimal range of deposition rates based upon the teachings of Namiki, Nemani, and Goto. It has been held that, "Where the general

Art Unit: 1762

conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). See also MPEP 2144.05. Therefore, it would have been obvious to one having ordinary skill in the art at the time of the present invention to have modified the method taught by Namiki in view of Thomas, Nemani, and Goto by carrying out the second deposition step at a deposition rate of between about 30 Å/sec and about 60 Å/sec with a reasonable expectation of success, because Goto teaches that the deposition rate of silicon oxide thin films is a result dependent variable and that other deposition rates are possible.

20. Claims 10 – 12, 14, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Namiki in view of Thomas, and further in view of Fayet, et al. (International Patent Application Publication WO 97/44503, hereafter Fayet). Namiki and Thomas are cited for the same reasons discussed above, which are incorporated herein.

21. Regarding this Claim, Thomas teaches the process wherein the oxygen and the first and second organosilicon compounds are fed through an open-ended injector positioned within the container and extending almost the length of the container (see Column 11, lines 57 – 65, Column 12, lines 1 – 38, and Figures 1 and 2), but does not teach the limitation wherein the injector is porous. However, Fayet teaches just such a limitation, wherein a porous injector is used in the plasma deposition of barrier films from organosilicon precursors in the presence of oxygen and under partial vacuum on the interior surface of a container (see Abstract, and Page 9, lines 14 – 23). Fayet also teaches, in Page 4, lines 18 – 29, that "it is now the object of the invention to create a method ... for treating the inside of containers, in particular containers with a narrow opening and containers made of heat sensitive material. ... Furthermore, the inventive method is to solve the problem of the even distribution of the reactant gas/vapour mixture in a more simple way than known such methods. The inventive apparatus is to be simple and adaptable for batchwise operation, i.e. for simultaneous treatment of a plurality of containers within the same apparatus." Therefore, it would have been obvious to one having ordinary skill in the art at the time of the present invention to have modified the method taught by Namiki in view of Thomas by utilizing the porous injector as taught by Fayet, because Fayet teaches that such injectors are known in the art, and because

Art Unit: 1762

Fayet teaches their use to achieve uniform deposition of thin barrier films on the interior surfaces of plastic containers.

22. Regarding Claims 11 and 12, Fayet does not explicitly teach the process wherein the porous injector is a graded porous injector, wherein porosity increases toward the base of the container in a stepwise fashion. However, Fayet does teach, in Column 6, lines 22 – 30, that “for establishing a gas/vapour concentration in the plasma being as homogeneous as possible, the perforation or porosity of the wall of the inner member forms a regular pattern over the surface of the inner member. If the plasma area, e.g. due to a complicated shape of the container to be treated, contains regions of different widths, the perforation pattern is designed such that in regions of wider plasma (larger distance between inner member and container wall) accordingly more gas/vapour passes through the wall of the inner member due to more and/or larger perforations or pores in this area.” That is, Fayet is explicitly teaching the idea that different porosities may be used in different sections of the inner member/injector, and that larger perforations or more pores may be used to increase the porosity of the member to increase vapor flow. In the case where the substrate container is wider at the bottom section, Fayet provides the motivation to increase the porosity in that bottom section to allow for more vapor flux into that section. Therefore, it would have been obvious to one having ordinary skill in the art at the time of the present invention to have modified the method taught by Namiki in view of Thomas and Fayet by using a graded porous injector, wherein porosity increases toward the base of the container, to have achieved successful deposition of uniform thin films on the inner surface of containers with increasing widths as taught by Fayet.

23. Regarding the limitation of Claim 12 that porosity increase in a stepwise fashion, any increase in porosity must necessarily increase in a stepwise fashion in an injector that contains holes/pores, because only a discrete number or total area of holes can be achieved per unit length. Therefore, the teaching and motivation discussed for Claim 11 inherently teaches the limitations of Claim 12 as well.

24. Regarding Claim 14, Fayet teaches the process wherein the inside and the outside of the container are both maintained at a partial vacuum, wherein the partial vacuum of the outside of the container is set a) so as not to allow plasma formation on the outside of the container; and b) so as to be

Art Unit: 1762

different from the partial vacuum on the inside of the container (see Column 5, lines 5 – 22, Column 8, lines 14 – 26, and Column 9, lines 1 – 5).

25. Regarding Claim 15, Fayet teaches the process wherein the partial vacuum on the inside of the container is in the range of 1 μ bar to 100 mbar, and the partial vacuum on the outside of the container is greater than 100 mbar or less than 1 μ bar (see same citations as for Claim 14, discussed above).

Conclusion

26. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ronald D. Lafond whose telephone number is (571) 270-1878. The examiner can normally be reached on M - F, 9:30 AM - 6 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on (571) 272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


RDL


FRED J. PARKER
PRIMARY EXAMINER